Petr Stepanov

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> Ph.D. graduate in physics with expertise in materials science, gamma spectroscopy, defect studies, and nuclear physics. Over 7 years of experience in data analysis, particle simulations and scientific software development.

Summary of Qualifications

- More than 7 years of experience in GUI desktop software development for data analysis and statistics (C++, ROOT, Qt, Python, Wolfram Mathematica).
- Solid background in Monte-Carlo particle simulations (Geant4) in high-energy physics (HEP) and photonics research.
- BASH scripting on High-Performance Computing (HPC) Linux environment.
- Hands-on experience with data acquisition setups and fast electronics (Hamamatsu, ORTEC, Canberra, Tektronix).
- Strong materials science skills. Application of the positron spectroscopy (PAS) and SEM techniques for defect characterization and porosity studies in materials.

Work Experience

Research Collaborator (On-Site)

Thomas Jefferson National Laboratory (JLab), Newport News, VA. *Jul 2020 - Jan 2023*

- Coded a Geant4-based simulation for studying the optimal light guide length (range 0-10 cm) for the EM calorimeter used in the Electron-Ion-Collider (EIC) project. Link to GitHub.
- Used Machine Learning (ML) techniques to perform binary classification of thousands of signals from a data acquisition (DAQ) setup. Link to GitHub.
- Applied CERN ROOT framework (C++) to perform statistical analysis of a significant amount (over 100 GB) of the raw experimental data of the Kaon LT experiment at JLab. Link to GitHub.
- Utilized SLURM functionality on the High-Performance Computing (HPC) environment to execute a series of simulations in parallel. This reduced the wall time by more than 10 times.
- Set up data acquisition system that performs triggered waveform acquisition involving 3 devices - Tektronix oscilloscope, Network Attached Storage, and RedHat computer (SAMBA, Python, National Instruments NI-VISA library).
- Contributed 100+ shifts at Hall C at the Thomas Jefferson Particle Accelerator facility for the Pion LT project.

Postdoctoral Researcher (Remote)

Catholic University of America (CUA), Washington, DC. *Jul 2020 - Jan 2023*

- Programmed a Geant-4 computer simulation (C++, CMake, Eclipse IDE, gdb) to study the performance of a novel scintillation material for EIC, Brookhaven National Lab. Link to GitHub.
- Visualized energy deposition profiles and calculated energy resolutions for a variety of detector assemblies.
- Teaching experience. Mentoring students within a 3-month Research Experiences for Undergraduates (REU) program at the Physics Department at CUA.
- Enhanced debugging of the CERN library source code led to the publishing of more than 10 bug reports on the ROOT (C++) forum.

Research Assistant

Bowling Green State University (BGSU), Bowling Green, OH. *Aug 2014 - May 2020*

- Assembled positron lifetime and Doppler spectrometers from ORTEC and Canberra (Mirion) fast electronic units. Utilized High-Purity Germanium Detectors (HPGe) and scintillation-based detector systems for single-photon counting.
- Developed three open-source programs (C++, CERN ROOT) for a novel interpretation of the positron lifetime and Doppler experimental spectra.
  - Derived and solved kinetic equations describing the formation and chemical reactions of e+ and Ps atoms in solids, liquids, and nano-powders (Wolfram Mathematica).
  - Incorporated physical parameters (grain size, defect concentrations, rate constants) into custom models (PDFs with convolution) for fitting the experimental spectra (RooFit).

- The above research allowed for the estimation of defect concentrations and sizes in solids, classification of defect types (vacancies, dislocations), and characterization of the chemical decoration of defects.
- Wrote three desktop GUI programs for spectra fitting and interpretation (C++, CMake, ROOT, Qt, Java)
  - GitHub repositories contain over 10k lines of code in total: TLIST Processor, SW Calculator, RooPositron.
  - Extended default ROOT GUI library (Qt-based) to support the MVP design pattern.
- Wrote a GUI application LuminApp (Java, Swing) to parse and merge time-stamped data from optical spectrometer and thermometer. This increased data processing time by two orders of magnitude.
- Developed static website (Hexo, Gulp, Bootstrap) and visual identity for the SelimLab research group. The website has a 99% Google performance rank and features 700 ms time to interactive metrics.
- Maintained local Apache HTTP server physics.bgsu.edu hosting over 10 websites at the BGSU.
- Created website for the ICPA-18 international conference with registration (over 150 users) and payment system workflow (WordPress, PHP, Recurly.js), and landing pages for events.

Education

Bowling Green State University (BGSU) • OH, United States *Aug 2014 - May 2020*

Ph.D. in Photochemical Sciences • GPA 3.423. Dissertation: Novel developments in positron spectroscopy (PAS).

Ohio Supercomputer Workshop • OH, USA *Jan 2017 - Feb 2017*

Hands-on sessions in High-Performance Computing Infrastructure (HPC, SSH, BASH, SLURM).

National Research Nuclear University (MEPhI) • Moscow, Russia *Sep 2004 - Feb 2011*

B.S. and M.S. in Solid State Physics. Thesis: application of PAS for defect concentration studies in bulk materials.

Professional Networks

- Find examples of my code on GitHub (50+ repositories).
- Discover my professional contacts on LinkedIn (200+ connections).
- Skim through the list of my publications on Google Scholar (24 articles, 300+ citations).

Relevent Interests

- Hosting an open-source project for keyboard remapping on Linux 300+ stars on GitHub.
- Developed a RAMDisk plugin for Linux that provides 50% increase in source code indexing time.
- Created two shared libraries for the ROOT data analysis framework [1, 2].
- Right to repair follower. Collecting and repairing old phones and laptops.
- Worked as mechanic and fabricator at a non-profit automotive shop (part-time, Oregon City, OR).